

NEW LOWER MISSISSIPPIAN TRILOBITES FROM THE CHOUTEAU GROUP OF MISSOURI

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ABSTRACT

Reexamination of existing trilobite collections from the Kinderhookian (Lower Mississippian) Chouteau Group of central and northeastern Missouri indicates that two different suites of trilobites are present in these two areas of the state. Moreover, the study of these collections has led to the erection of a new genus and four new species. The new genus, *Ameropiltonia*, is based on a new species, *A. lauradanae*. This genus and species is commonly confused with *Breviphillipsia sampsoni* (Vogdes). *Elliptophillipsia rotundus*, n. sp., differs from the type species of this genus by possessing a rounded frontal lobe to the glabella. The other new species, *Perexigupyge chouteauensis* and *Richterella hesleri*, are present in the Compton Limestone of Marion and Ralls counties of northeastern Missouri.

Variations in trilobite species found in the Compton Limestone of central Missouri and the northeastern part of the state are interpreted to be environmentally related. It appears that the lime mudstone and wackestone lithologies characteristic of the Compton Limestone of central Missouri were deposited in a low-energy, subtidal shelf setting. The lime packstone-grainstone strata of northeastern Missouri are interpreted to have formed as a tidal sand belt on the eastern margin of the Burlington shelf.

KEY WORDS: Missouri, trilobites, Mississippian, Kinderhookian, Chouteau

INTRODUCTION

Trilobites are well known from the Lower Mississippian (Kinderhookian) Chouteau Group of Missouri. Vogdes (1888, 1891), Branson and Andrews (1938), Hessler (1963, 1965), and Brezinski (1986, 1988a) are several of the more salient references dealing with trilobites from the Kinderhookian strata of Missouri. Collection of new material and reevaluation of preexisting collections have brought to light a number of previously undescribed species and a new genus. Moreover, reexamination of known collections indicates that broadly distributed biofacies were present during the Kinderhookian. These regional trilobite biofacies parallel distinct lithofacies within the Chouteau Group. The purpose of this paper is to briefly describe the lithofacies and associated trilobite faunas present in the Chouteau Group of Missouri, and to describe a new genus and four new species of trilobites.

The trilobites described in this report were recovered from three localities. Locality 1 is located in central Missouri along the abandoned MKT Railroad right-of-way, at the base of the river bluffs of the Missouri River, one mile north of the town of Easley, Boone County. The remaining two localities are located in northeastern Missouri. Locality 2 is along County Road 183, one mile south of Warren, Marion County. Locality 3 is located along the spillway of the Clarence Cannon Dam, Ralls County.

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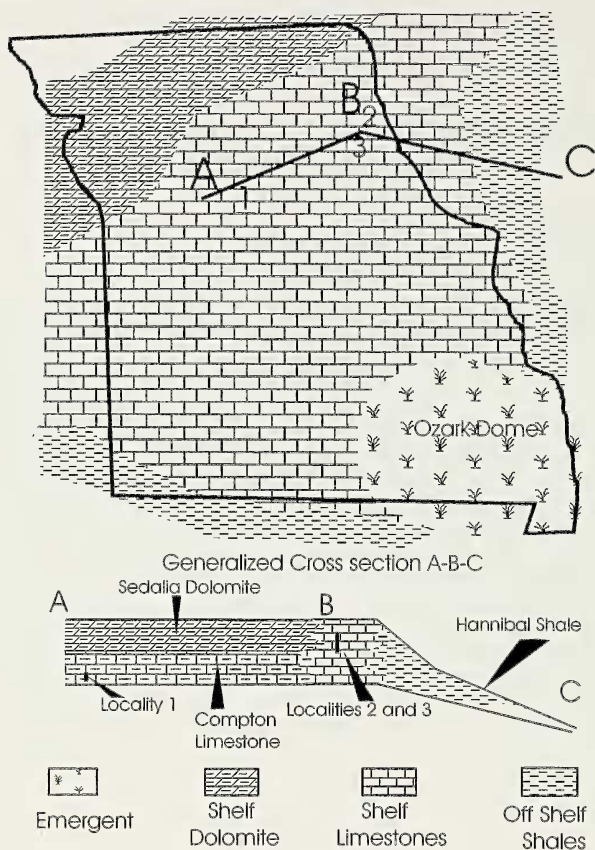


Fig. 1.—Generalized early Mississippian paleogeography of Missouri (modified from Lane and De Keyser, 1980:fig. 8). Location of the three trilobite localities (labeled 1–3) used in this study with their relative stratigraphic position illustrated on cross section. Cross-section A–B–C section line illustrates relative stratigraphic distribution of formations within the Chouteau Group of Missouri, modified from Thompson (1979). No vertical scale implied.

Morphological terminology used in this paper follows that described by Whittington (1997). Collections utilized in this study were made by J. L. Carter, A. Kollar, and the author and are repositied in the invertebrate fossil collections of Carnegie Museum of Natural History (CM).

REGIONAL FACIES

The Kinderhookian strata of Missouri is a complex mosaic of intertonguing limestone, dolomite, and shale that were lumped together as the Chouteau Group by Thompson (1979). The composite units include the Northview Shale, Sedalia Dolomite, Compton Limestone, and Hannibal Shale (Fig. 1). The composite units that make up the Chouteau Group, and especially the Compton Limestone, exhibit a broad facies change from central to eastern Missouri (Thompson, 1979). In central Missouri (Boone and Pettis counties), where the trilobite faunas have been well described (Branson and Andrews, 1938; Hessler, 1963, 1965; Brezinski, 1986, 1988a), the main fossiliferous unit, the Compton Limestone, consists of

nodular- to medium-bedded, argillaceous, fossiliferous, lime mudstone to wackestone. King (1980) interpreted this lithology as having formed in an open shelf environment of deposition, below storm wave base. Trilobites characteristic of this facies include *Breviphillipsia sampsoni* (Vogdes), *Comptonaspis swallowi* (Shumard), *Griffithidella welleri* (Branson and Andrews), *Dixiphopyge armatus* (Vogdes), and *Ameropiltonia lauradanae*, n. gen. and n. sp. Uncommon faunal components include *Proetides colemani* Hessler, *Elliptophillipsia rotundus*, n. sp., and *Brachymetopus brezinskii* Hahn and Hahn.

To the east, in Marion and Ralls counties (Fig. 1), the lime wackestone of the Compton Limestone is replaced through lateral facies change. In this area an unnamed Compton Limestone equivalent consists of medium-bedded, locally cross-bedded, highly fossiliferous lime packstone to grainstone. The unnamed Compton equivalent appears to have been deposited at a much higher energy level than the nodular-bedded wackestone of the central part of the state. This is indicated by the lack of carbonate mud and the presence of cross-bedded grainstones. This regional facies variation is interpreted to represent the change from subtidal, low-energy, carbonate mud deposition of the inner shelf to tidally influenced, sand deposition of the outer shelf. Consequently, the grainstone facies within the Chouteau of northeastern Missouri are interpreted as representing a shelf margin shoal deposits.

The trilobite fauna present in the packstone-grainstone facies of the Compton Limestone of northeastern Missouri is quite different than that of the argillaceous, lime mudstone-wackestone of central Missouri. In northeastern Missouri the most common trilobites include *Griffithidella newarkensis* Hessler, *Proetides insignis* (Winchell), *Richterella snakedenensis* Hessler, and *Perexigupyge chouteauensis*, n. sp. A rarer component is *Richterella hessleri*, n. sp. This fauna is interpreted to have inhabited high-energy environments of deposition rather than the quieter subtidal environments which existed in central Missouri.

In western Illinois, the equivalent Chouteau Limestone undergoes an additional facies change and rapidly thins eastward (Lineback, 1969). In what is now the Mississippi River Valley, the grainstone facies is replaced by a thin (< 3 m) dark-gray, bioturbated, lime wackestone. Brezinski (1998) interpreted this facies as having formed in a deep-water, sediment-starved setting. The depth of the water in this basinal environment may have exceeded 180 m (Lineback, 1969).

The trilobite fauna from the Chouteau Limestone of Illinois differs from either of the Chouteau lithofacies observed in Missouri. The Illinois fauna consists of *Pudoproetus chappelensis* (Hessler), *Griffithidella doris* (Hall), *Phillibole planicaudus* (Brezinski), and *Thigriffides roundyi* (Girty). Brezinski (1998) proposed that the Illinois fauna was similar to that found in the Welden Limestone of Oklahoma and the Chappel Limestone of Texas because these areas shared a similar depositional setting. These interpreted deep-water species are generically different from the fauna found within the presumed shelf deposits of Missouri.

SYSTEMATIC PALEONTOLOGY

Order Proetida Fortey and Owens, 1975

Family Phillipsiidae Oehlert, 1886

Genus *Ameropiltonia*, **new genus**

Type Species.—*Ameropiltonia lauradanae*, n. sp.

Other Species Assigned.—Only the type species is currently assigned.

Diagnosis.—Exoskeleton highly vaulted, covered with coarse tubercles. Cephalon strongly arched in transverse and longitudinal profile. Genal angle rounded. Glabella parallel-sided to mildly forward-tapering, reaching to overhanging anterior border. Pygidium semicircular, ribs sharply overhanging pleural furrows, interpleural furrow lacking.

Remarks.—In his erection of the genus *Breviphillipsia*, Hessler (1963) designated *Phillipsia sampsoni* Vogdes as the genotype (i.e., type species). As a type species, *B. sampsoni* has been somewhat of an enigma because Hessler (1963:pl. 61 and 62) included a number of specimens that differ considerably from the holotype. It appears that all of the specimens, except the holotype, that Hessler assigned to *B. sampsoni* differ in various characters from the holotype of *Phillipsia sampsoni*. The holotype (Hessler, 1963:pl. 61; fig. 15–17, 21) has a forwardly tapering, broadly rounded glabella that is mildly constricted at γ . The anterior facial sutures diverge from γ to β , and the posterior segment has a relatively long and straight ϵ to ζ section. The anteriorly rounded glabella extends to the anterior border furrow, but not to the anterior margin, and the pygidium has a well-defined interpleural furrow which gives the pygidial ribs anterior and posterior bands. Furthermore, the glabella is covered with small granules and the pygidium has no prosopon. Most of the coarsely ornamented specimens illustrated by Hessler (1963:pl. 61, fig. 22, 23, 27, 28; pl. 62, fig. 1) are not assignable to *B. sampsoni*. The disparity of shape of the glabellae among the specimens suggests that the coarsely ornamented specimens do not even belong to the genus *Breviphillipsia*. The species *B. sampsoni* is herein restricted to those specimens from central Missouri similar to the holotype in that they exhibit the tongue-shaped glabella that extends to the anterior border furrow and a pygidium that exhibits both pleural and interpleural furrows. Thus, most fossils referred to *B. sampsoni* (see Levi-Setti, 1975; Brezinski, 1986:fig. 4) belong to both a different genus and species. A new genus, *Ameropiltonia*, is established to include species from the Compton Limestone of Missouri that exhibit the coarsely tuberculate prosopon.

Comparison.—*Ameropiltonia* is similar to *Piltonia* in shape of the glabella, ornamentation, and outline and character of the pygidium. It is distinguished from the latter genus by the lack of a preglabellar field, anterior facial sutures that trace very close to the dorsal furrow rather than diverge anteriorly, and a shorter pygidium that has fewer rings and ribs. American representatives of *Piltonia* such as *P. tuberculata* (Meek and Worthen, 1870) and *P. eurybathrea* (Hessler, 1963) have much longer pygidia, a short preglabellar field, and anterior facial sutures that diverge moderately from γ to β . Another closely related genus, *Eocyphinium*, has a forwardly expanding glabella and longer pygidia than *Ameropiltonia*.

Range.—Late Kinderhookian.

Ameropiltonia lauradanae, new species

(Fig. 2A–E)

Breviphillipsia sampsoni Hessler, 1963:pl. 61, fig. 13, 19, 20 (not pl. 61, fig. 15–17, 21, 22, 27, 28; pl. 62, fig. 1); Hahn and Hahn, 1972:120–121; Brezinski, 1986:fig. 4.1, 4.5, 4.8.

Diagnosis.—Highly vaulted species with coarse tuberculation. Glabella outline quadrate, slightly anteriorly tapering to parallel-sided, broadly rounded anteriorly, strongly arched in longitudinal and transverse profile, overhanging anterior margin. Dorsal furrow deep, narrow. Palpebral lobes small, anteriorly located. Pygid-

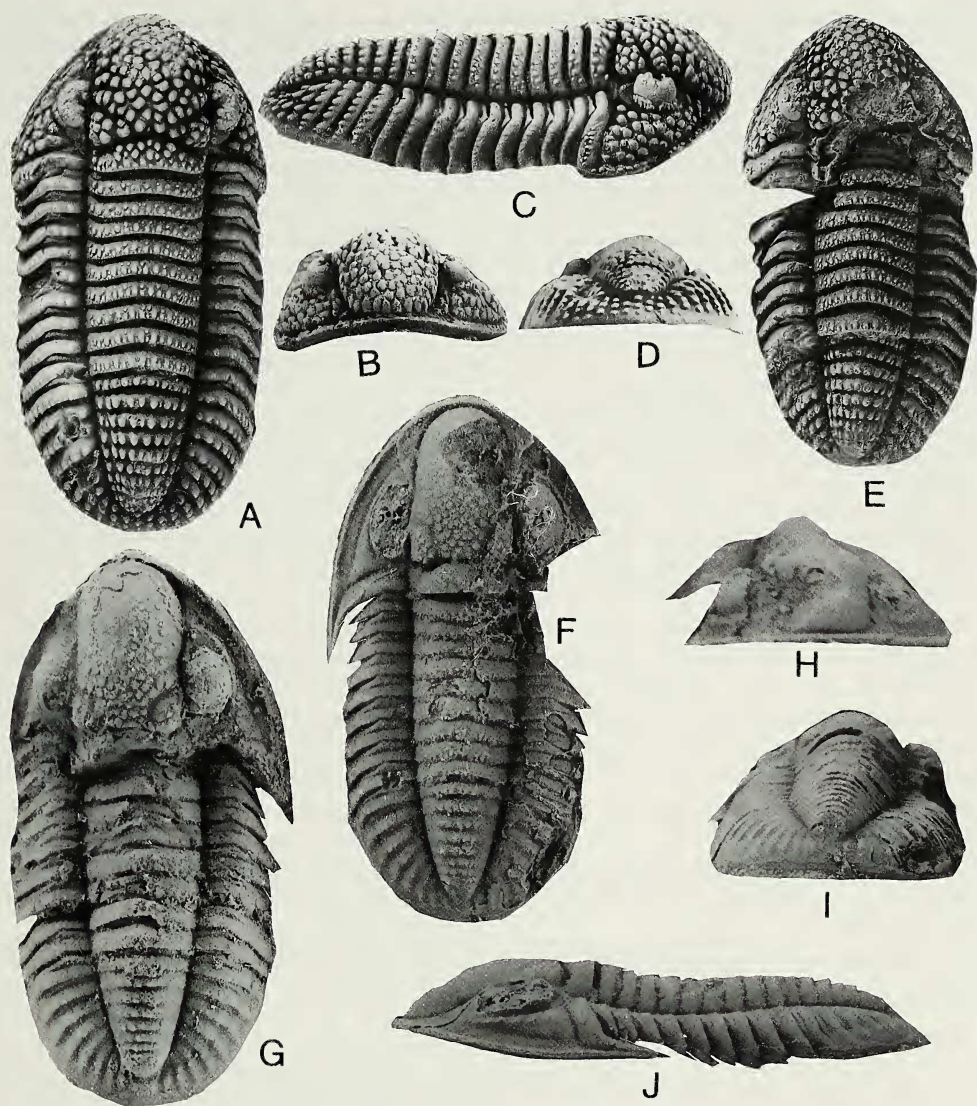


Fig. 2.—A–E. *Ameropiltonia lauradanae*, n. gen. and n. sp. A–D. Holotype specimen from the Compton Limestone, Boone County, Missouri, Locality 1, CM 45115, $\times 3.5$. D. Paratype specimen from Locality 1, CM 45116, $\times 3.0$. F–J. *Elliptophillipsia rotundus*, n. sp. F, H–J. Holotype specimen from the basal Compton Limestone, Boone County, Missouri, Locality 1, CM 45118, $\times 4.0$. G. Paratype specimen, CM 45119, $\times 4.0$.

ium highly vaulted, with robust, wide, rounded axis, and deeply incised pleural furrows.

Holotype.—A complete exoskeleton from the Compton Limestone at locality 1, Boone County, Missouri, CM 45115, collected by the author.

Paratypes.—A partial exoskeleton and a pygidium from locality 1, CM 45116 and 45117, collected by the author.

Description.—Exoskeleton outline oval, vaulting high. Cephalon outline parabolic, genal angle

sharply rounded. Glabella with straight sides, nearly parallel to very slightly forward-tapered, broadly rounded anteriorly; sides vertical, mildly arched crest in transverse profile; strongly longitudinally arched. Frontal lobe with prosopon of coarse polygonal tubercles, meeting and/or overhanging anterior border. S1 narrow, deep, straight; S2–S4 marked by separation of the coarse prosopon. L1 outline triangular. Dorsal furrow deepest between eyes, shallowest anteriorly. Occipital furrow deep, sinuous, overhung by L1. Occipital lobe wide at axial line. Palpebral lobes small, crescentic, ornamented by a line of tubercles along outer edge. Anterior branch of facial sutures parallel and close to sides of glabella, sharply rounded at β . Posterior branch of facial sutures with a short straight section at ϵ . Eyes small, reniform, with vertical sides, and a row of tubercles at the base. Librigenae descending steeply from eye to narrow, shallow, lateral border furrow. Lateral border sharply crested, underturned on its outer edge, with a row of small tubercles on its inner edge. Posterior border furrow deep, relatively wide. Posterior cephalic border wide, with a row of posteriorly directed tubercles at crest.

Thorax of nine equal tergites. Axial lobe robust, rings wide, semicircular in transverse profile ornamented with two rows of small tubercles. Ring furrows deep, narrow, sinuous. Dorsal furrow, deep, relatively straight. Pleural fields proximally flattened, sharply curved at fulcrum, nearly vertical at distal ends. Pleural tips sharply angular.

Pygidium outline semicircular, highly vaulted. Axis robust, wide, semicircular in transverse profile, mildly arched in longitudinal profile, sharply rounded at posterior terminus, not reaching posterior of pygidium, composed of ten to 11 rings. Rings wide, sharply crested, ornamented with a row of coarse tubercles that are posteriorly directed, deep. Ring furrows deep, straight to slightly bowed forward over axis. Pleural fields strongly arched in transverse profile, mildly arched in longitudinal profile, composed of ten to 11 ribs that extend behind the axis. Posteriormost ribs defined by rows of tubercles. Anterior ribs wide, sharply crested, and ornamented with a row of coarse tubercles that overhang very deep pleural furrows that extend to and overhang margin.

Remarks.—Brezinski (1986:fig. 4) interpreted variations in coarseness of the prosopon within *Breviphillipsia sampsoni* as the result of phenotypic plasticity of individuals occurring in different depositional environments. The taxonomic refinement and reassignment in the current paper suggest otherwise. The shape of the glabella and presence of interpleural furrows on the individuals illustrated in figures 4.3 and 4.4 suggest that these specimens may be assignable to *Breviphillipsia*. Figures 4.1, 4.5, and 4.8 lack interpleural furrows, and thus appear to be assignable to *Ameropiltonia*. It is not clear now whether the coarsely ornamented specimens illustrated by Hessler (1963:pl. 61, fig. 22, 27, 28; pl. 62, fig. 1) are compacted specimens assignable to *A. lauradanae* or to a different species of *Ameropiltonia*.

Distribution.—Chouteau Formation of Boone County, Missouri; Cuyahoga Formation of Ohio.

Etymology.—Named for Laura Dana Brezinski.

Genus *Elliptophillipsia* Hessler, 1963
Elliptophillipsia rotundus, new species
(Fig. 2F–J)

Diagnosis.—Glabella long, broadly rounded in the frontal lobe, slightly constricted at the palpebral lobes. Anterior border narrow, sharply rounded at crest. S1 arcuate; L1 suboval.

Holotype.—A nearly complete exoskeleton from the basal Compton Limestone at locality 1, Boone County, Missouri (see Brezinski, 1986:location 1), CM 45118, collected by the author.

Paratypes.—A partial exoskeleton and a cranidium, from the same locality, CM 45119, 45120, collected by the author.

Description.—Exoskeleton outline elliptical, vaulting low. Cephalon outline parabolic. Glabella long, narrow, slightly constricted between anterior end of palpebral lobes, broadly rounded in the frontal lobe, exhibiting granular prosopon. S1 relatively deep, arcuate; L1 suboval. S2–S3 faint. Oc-

capital furrow straight, shallow, narrow; occipital lobe wide at axial line. Dorsal furrow relatively deep, slightly sinuous. Anterior border narrow, sharply crested; anterior border furrow deep in front of glabella and much shallower in front of anterior fixigenae. Palpebral lobes large, about one-quarter of total cranial length, anteriorly located. Anterior section of the facial sutures straight, slightly anteriorly divergent; posterior section with a long straight section at ϵ . Eyes large, about one-third of total cranial length, outline hemispherical; ocular platform narrow, flat. Lateral border furrow broad, deep, shallowing and narrowing posteriorly, extending well out onto genal spine. Border sharply crested, narrow. Posterior border furrow shallow, narrow; posterior border wide, evenly convex. Genal spine short, stout.

Thorax of nine subequal segments. Axis wide, evenly arched in transverse profile, rings wide, furrows narrow. Dorsal furrow narrow, relatively deep. Pleural fields narrow, flat adjacent to dorsal furrow, gently arched at fulcrum, descending to sharply rounded pleural tips.

Pygidium short, outline semicircular, vaulting low. Axis narrow, sharply posteriorly tapering, acutely rounded at terminus, approximately 0.8 total pygidial length. Axis semicircular in transverse profile, straight in longitudinal profile, composed of nine rings ornamented at crest with a row of small granules. Ring furrows shallow, narrow, deepest over axis. Dorsal furrow narrow, relatively deep. Pleural fields mildly arched in transverse profile, flat in longitudinal profile, composed of eight to nine ribs. Anterior ribs composed of a broad anterior band and a short, narrow posterior band. Posterior ribs not separated into bands. Border narrow, flat.

Remarks.—*Elliptophillipsia rotundus*, n. sp., differs from *E. ellipticus* (Meek and Worthen) by having a constriction to the glabella between the palpebral lobes, and a frontal lobe that is rounded. The holotype of *Elliptophillipsia ellipticus* (see Hessler, 1963:pl. 62, fig. 16, 17, 21) has a forward-tapering glabella that is squared off in front, and an anterior border furrow that is wider and deeper. No other North American Carboniferous trilobite genus displays such an axial elongation to the glabella.

The long, tongue-shaped glabella of *Elliptophillipsia rotundus* is similar to that seen in the European genus *Linguaphillipsia*. *Linguaphillipsia* differs from *Elliptophillipsia* by having an elongate pygidium.

Distribution.—Late Kinderhookian of Boone County, Missouri, and Jersey County, Illinois.

Etymology.—*Rotunda*, Latin, refers to the rounding of the anterior of the glabella.

Genus *Perexigupyge* Brezinski, 1988b
Perexigupyge chouteauensis, new species
(Fig. 3A–G)

Diagnosis.—Glabella tongue-shaped, widest between the palpebral lobes. Pygidium outline semicircular, evenly convex, low relief.

Holotype.—A fragmentary cranidium, from the grainstone facies of the Compton Limestone, at locality 2, Marion County, Missouri, CM 45121, collected by the author.

Paratypes.—Four pygidia and an external and internal mold of a cranidium from localities 2 and 3 of Marion and Ralls counties, Missouri, CM 45122, 45123, collected by A. Kollar, J. L. Carter, and the author.

Description.—Cranidium low in relief and vaulting. Glabella long, smooth, tongue-shaped, widest between the palpebral lobes, tapering forward to about γ , rounded anteriorly, extending to broad, shallow, anterior border furrow. Anterior border rounded. S1 short, shallow, arcuate; S2 short, perpendicular to shallow dorsal furrow; S3 slightly anteriorly directed adaxially. L1 small, oval, incompletely isolated from frontal lobe. L2–L3 small, faint. Palpebral lobes long, narrow. Anterior branch of facial sutures with a long, straight section, diverging moderately from γ to β , sharply rounded at β . Occipital furrow narrow, deep, straight. Occipital lobe wide, flat.

Pygidium outline semicircular, vaulting low. Axis short, narrow, mildly arched in transverse profile, straight in longitudinal profile, strongly posteriorly tapering, sharply rounded at terminus, reaching 0.75 total pygidial length, composed of 11 to 12 smooth, wide (transverse) rings. Ring furrows shallow,

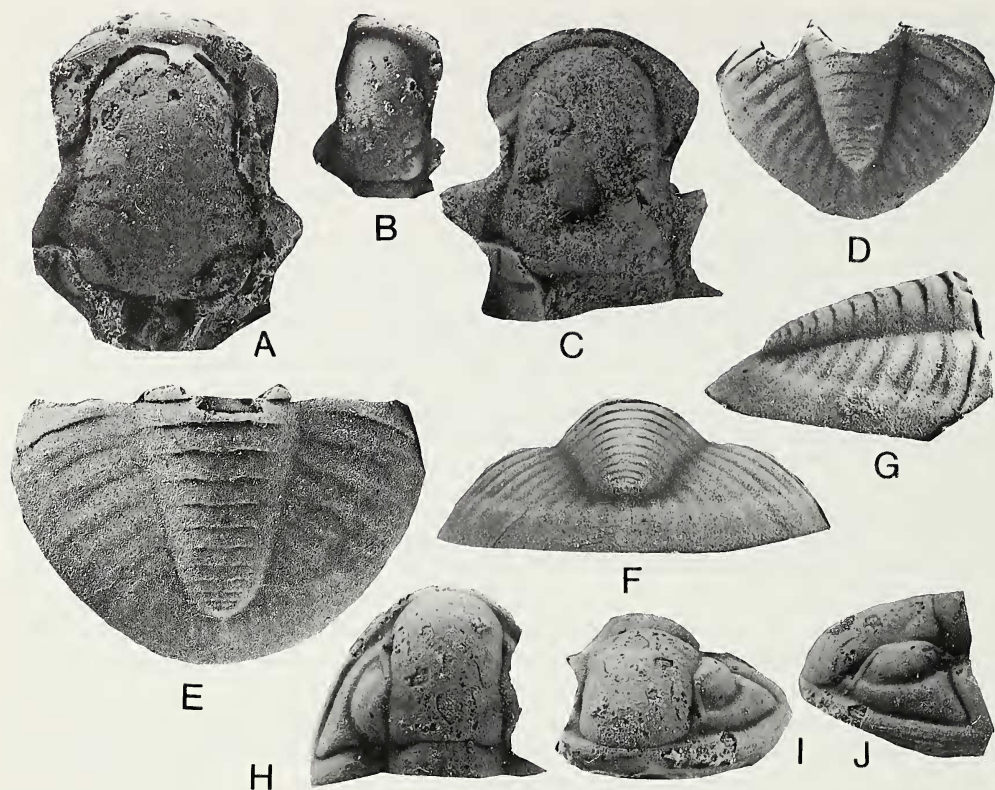


Fig. 3.—A–G. *Perexigypyge chouteauensis*, n. sp. A. Partially exfoliated holotype cranidium, Locality 2, Marion County, Missouri, CM 45121, $\times 4.0$. B. Cast of external mold of partial paratype cranidium, CM 45122a, $\times 4.0$. C. Internal mold of paratype cranidium, CM 45122b, $\times 3.5$. D. Nearly complete paratype pygidium, CM 45123a, $\times 3.0$. E–G. Dorsal, posterior, and lateral views of paratype pygidium, CM 45123b, $\times 4.0$. H–J. *Richterella hessleri*, n. sp., partial holotype cephalon from Locality 2, Marion County, Missouri, CM 45124, $\times 3.5$.

narrow, straight, shallower laterally. Pleural fields mildly arched in transverse profile, straight in longitudinal profile, composed of eight to nine ribs. Ribs consist of broad, slightly elevated anterior bands, and narrower, lower, posterior bands. Interpleural furrows shallow. Anterior bands extend onto border nearly to margin. Border relatively wide and of equal width along entire margin, exhibits same slope as pleural fields. Margin sharply underturned.

Remarks.—*Perexigypyge chouteauensis*, n. sp., differs from *P. hodgesi* Brezinski, 1988, by having a cranidium with much lower relief, and a glabella that is tongue-shaped rather than nearly cylindrical. The pygidium of *P. chouteauensis* is much lower in relief, and has more poorly defined pygidial rings and ribs. *Perexigypyge gerki* Brezinski, 1988, is similar to *P. chouteauensis* with the forwardly tapering glabella, but differs from the latter species by having a more triangular outline to the glabella, narrower, more forwardly located palpebral lobes, and more arcuate trace to the anterior facial sutures which causes them to appear more broadly divergent. The low relief and vaulting of *P. chouteauensis* is similar to species of *Spergenaspis* as illustrated by Brezinski (1987). Indeed, the shape of the glabella and smoothness of the pygidium are suggestive of a species of *Spergenaspis*. However, *P. chouteauensis* lacks a preglabellar field

which characterizes *Spergenaspis*, and possesses the extension of the anterior band of the pygidial ribs onto the border, a character present in *Perexigupyge*. It seems plausible, inasmuch as both genera tend to be present in similar environmental settings, that morphological convergence occurred between these two genera. Conversely, it is possible that *Spergenaspis* descended from *Perexigupyge*.

Distribution.—Present in the late Kinderhookian of Marion and Ralls counties, Missouri.

Etymology.—Named for the Chouteau Group from which the type material was collected.

Genus *Richterella* Hessler, 1965
Richterella hessleri, new species
(Fig. 3H–J)

Diagnosis.—Cranidium moderately vaulted, glabella smooth, with parallel sides and a slight constriction between the palpebral lobes, anterior border very narrow, rounded, border furrow absent. Palpebral lobes narrow, facial sutures with short posterior section, and long, straight, slightly diverging anterior section.

Holotype.—An incomplete cephalon from the grainstone facies of the Compton Limestone of locality 2, Warren, Marion County, Missouri, CM 45124, collected by the author.

Description.—Cephalon semicircular to slightly parabolic in outline, moderately vaulted, relief low. Cranidium longitudinal profile flat becoming more strongly arched anteriorly, evenly rounded in transverse profile. Glabella with nearly parallel sides, a very slight constriction between the palpebral lobes. S1 shallow, arcuate; L1 suboval. S2 straight, shallow; L2 subrectangular. S3 and L3 obsolete. Frontal lobe bluntly rounded anteriorly, meeting a very narrow, rounded border. Anterior branch of facial sutures long, straight, only slightly diverging from γ to β , sharply rounded at β . Posterior section of facial sutures with a short, straight, parallel section, otherwise posteriorly diverging. Occipital furrow shallow, narrow, straight except where overhung by L1; occipital lobe broad, flat. Dorsal furrow, narrow, relatively deep between eyes, shallower forward. Palpebral lobes long, narrow. Eyes large, with distinct, deep, ocular furrow that widens in front of the eye. Genal fields smooth, slightly inflated, steeply descending into deep, narrow, lateral border furrow that becomes broader and shallower anteriorly. Lateral border narrow in dorsal view, relatively broad, evenly rounded in lateral view, with faint terrace lines. Posterior border furrow, deep, narrow, directed to the posterior laterally; posterior border wide, evenly rounded.

Remarks.—*Richterella hessleri*, n. sp., is diagnosed by the shape of the glabella which is parallel-sided, and by the bluntly rounded frontal lobe and narrow anterior border. *Richterella hessleri* can be distinguished from *R. snakedenensis* Hessler, 1963, by the more posterior location of the palpebral lobes, medially constricted glabella, and wider anterior border in the latter species. The shape of the glabella is similar to *Perexigupyge hodgesi* Brezinski, 1988. *Richterella hessleri* can be distinguished from *P. hodgesi* by the presence of an anterior border furrow, and by the more distinctively deeper dorsal, occipital, and glabellar furrows in the latter species.

Distribution.—Known from the late Kinderhookian Chouteau Group of Marion County, Missouri.

Etymology.—Named in honor of R. R. Hessler who erected the genus *Richterella*.

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